

Separation of Cloud and Drizzle using Spectral Analysis for ARM Cloud Radar

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The W-band Atmospheric Radiation Measurement (ARM) Program Cloud Radar (WACR) systems are zenith pointing Doppler radars with the main purpose of determining cloud boundaries (e.g., cloud tops and bottoms).

A Parametric Time Domain Method (PTDM) to detect, estimate and separate cloud and drizzle echoes from vertically pointing Doppler spectra ARM radar data is introduced. PTDM model is developed using the collected ARM radar Doppler spectra data to retrieve the signal spectral moments. Goodness of fit parameters specifying the features of cloud Doppler spectra are defined. If the detection parameters exceed predetermined thresholds, the signal contains a mixture of cloud and drizzle. A drizzle map is processed to accommodate the location of cloud base and to reduce the uncertainty due to turbulence. At the locations where cloud and drizzle co-exist, the model is modified to include cloud and drizzle spectral parameters. Cloud and drizzle are separated using a similarity-based classifier.

Observations will be provided based on simulations for W-band ARM Azores radar data. It is shown that the method works with the single radar power spectra profile and performs well in most scenarios.